Monitoring of Hydrodynamics, Sediment Transport, and Water Quality in the Port of New York/New Jersey: Preliminary Results

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ABSTRACT:
The annual maintenance dredging requirement in New York Harbor is almost 4 million cubic yards. Authorized deepening projects, some of which are now underway, will raise the requirements for disposal of dredged material to more than 150 million cubic yards over the life of the projects. However, it is no secret that the silty material, which makes up much of the harbor's bottom, is encumbered by a complex mix of contaminants resulting from historic and current pollution sources. This contamination drastically limits disposal options for dredging projects. To meet the challenge of managing this material, the region, and particularly the State of New Jersey, has adopted a tripartite approach to dredged material management. First, the State of New Jersey declared that beneficial use of dredged materials shall be the preferred disposal option; and has developed a number of uses for these materials such as brownfields remediation. Second, the state, along with the federal agencies, funded and oversaw the development of a number of innovative technologies for decontamination, processing and use of dredged material, and for the reduction in siltation. Finally, the state, along with the State of New York, embarked on a toxics trackdown program designed to identify and eliminate the sources of contamination. This latter program, for which more than $30 million has been dedicated by the two states, is operated in conjunction with the Harbor Estuary Program for New York Harbor (HEP) and is a major component of the HEP Contaminant Assessment and Reduction Program (CARP). This presentation will focus primarily on CARP.

In New Jersey, hydrodynamic and water and suspended sediment quality studies are underway in Newark Bay, the Arthur Kill, and Kill van Kull. This work is coordinated with water and sediment quality sampling studies undertaken at the head-of-tide and within the tidal reaches of the major New Jersey tributaries that discharge to NY-NJ Harbor. The goal of these synoptic studies is to develop an understanding of the contaminant transport pathways within this region of the estuary. The program uses a combination of three (3) fixed mooring stations, shipboard measurements at specified locations, and shipboard transects throughout the area. Measurements include current profiles using a towed Acoustic Doppler Current Profiler; conductivity-temperature-depth measurements using a CTD system; measurements of turbidity using an Optical Backscatter Sensor; measurements of suspended sediment concentration and particle size spectrum using a laser-based scatterometer; and water and suspended sediment quality measurements using Trace Organic Platform Samplers (TOPS) and grab sampling devices. Preliminary analysis of the data collected over the past year indicates that the Newark Bay/Kills system is influenced by several types of forcings, including tide, wind, and freshwater inflow. These highly variable forcings are responsible for dramatic variations in hydrodynamic and sediment transport characteristics, including, for example, the connectivity of the system with the Hudson River. These transport characteristics play a significant role in determining the fate of sediment and water-borne contaminants in the Harbor. The presentation will describe the measurement program and data analysis, and will offer preliminary conclusions regarding the dominant transport processes – and links to contaminant transport – within the Newark Bay-Kills system.